OPERATOR'S MANUAL

for

CLAY ADAMS®

DYNAC® III CENTRIFUGE

Model No. 420104

BECTON
DICKINSON

CONTENTS

CONTENTS (Continued)

SECTION 1
INTRODUCTION

1.0 OVERVIEW

This manual contains operating instructions for the Clay Adams® DYNAC® III Centrifuge, Model 420104 (120VAC). The DYNAC® III Centrifuge can be used with interchangeable rotors and has a continuously adjustable electronic speed control and electronic tachometer, permitting the selection of a wide range of operating speeds. A zero speed switch, fail-safe positive cover lock, and other safety features are incorporated for maximum operator protection. Ten operator programmable memory locations are available for storage of time and speed settings. In addition, the centrifuge can calculate RPM (Revolutions per Minute) based on operator inputted RCF(Relative Centrifugal Force) values, and rotor/shield configuration.

FIGURE 1-1.
DYNAC ® III Multi-Speed Centrifuge

1.1 SYMBOL DEFINITIONS

The following is an explanation of the symbols found throughout the manual and located on the centrifuge units.

CAUTION - Risk of Personal Injury

This symbol is used in both the Caution and Warning messages to attract the user's attention to potential hazards when using the centrifuge.

CAUTION - Risk of Electrical Shock

This symbol is shown in this manual or on the instrument to warn the user of possible electrical hazards.

1.2 NOTES, CAUTIONS, AND WARNINGS

The following is an explanation of Note, Warning, and Caution boxes contained throughout this manual.

NOTE

Important Information about centrifuge use worthy of special attention.

WARNING

Information on an activity which potentially could cause injury to the user.

CAUTION

Information on an activity which potentially could cause damage to the centrifuge.

1.3 ELECTRICAL CAUTIONS AND WARNINGS

CAUTION

Read this manual before operating the DYNAC III Centrifuge.

THIS CENTRIFUGE IS FOR USE WITH A.C. (Alternating Current) ONLY.

Check data plate on back of instrument for the correct voltage and frequency.

WARNING

To avoid electrical shock, connect power cord only to an approved power source such as a 3-wire grounded receptacle. Where a 2-wire receptacle is encountered, have it replaced with a properly grounded 3-wire receptacle in accordance with the National Electrical Code. Do not, under any circumstances, remove the ground prong from the power plug.

Should the power cord or plug become cracked, frayed, broken or otherwise damaged, have the cord or plug replaced immediately by a qualified service person.

Unplug the power cord before servicing. The operator, however, should not perform any servicing except as specifically stated in this manual. Refer other problems to trained personnel, or return the instrument to Becton Dickinson Microbiology Systems for repair.

Never attempt to override electrical safety interlocks of the centrifuge.

1.4 SPECIMEN AND ENVIRONMENTAL WARNINGS

WARNING

Blood and body fluids may contain the Hepatitis B virus (HBV), Hepatitis C virus (HCV), human immunodeficiency virus (HIV), or other disease-causing agents. Handle all patient specimens as potential biohazards capable of transmitting infection. Wear appropriate personal protective equipment, including laboratory gloves, when collecting, handling and processing blood and body fluids.

In addition to wearing gloves, the use of disposable lab coats or gowns and protective glasses or goggles is recommended when working around the Centrifuge.

If a tube breaks in the shield, carefully remove broken glass with a hemostat or other device, using puncture resistant utility gloves.

WARNING

Use on the rotors, shields, cushions, and accessories specified in Appendix B.

Do not operate the centrifuge with specimens or materials having a density greater than 1.3g/mL. Doing so may cause damage to the centrifuge, and may cause unstable operation and cause the centrifuge to move off of the operating surface.

Do not operate the centrifuge in atmospheres containing flammable or volatile gases. Do not use the centrifuge to spin down flammable or volatile liquids.

1.5 INTENDED USE

The DYNAC III is a multi-purpose centrifuge, designed for clinical laboratories performing separations in hematology, chemistry, urinalysis, blood banking, microbiology and cytology. The DYNAC III is also useful in physician's and veterinarian's offices, particularly where moderate-to-large numbers of urine and fecal sedimentations, and serum/plasma separations are performed. Other applications are in industrial and university laboratories for general procedures in chemistry, pharmacology, food processing and agriculture where centrifugation is required.

Because of its compact size, the DYNAC III Centrifuge will fit into most laboratory refrigerators; it can also be placed in cold rooms for low temperature centrifugation.

1.6 AMBIENT TEMPERATURE PRECAUTIONS

To properly separate blood specimens, ambient room temperatures must not exceed 32°C (90°F). Operating the instrument where ambient temperatures are consistently above 32°C may result in sample damage.

1.7 GENERAL DESCRIPTION

The DYNAC III is a compact, portable centrifuge for laboratory use in separation and sedimentation procedures.

The centrifuge incorporates a one-piece aluminum guard bowl attached to a stable base. The guard bowl, which is of a heavy gauge construction, affords protection to the operator. The finish is baked enamel inside and out to facilitate cleaning of the bowl.

The motor is shock-mounted to the base by three vibration isolators. Four rubber feet are bolted to the bottom of the base plate. Motor bearings are permanently lubricated.

Rotors (heads) are easily installed and locked on the motor shaft by means of a drive pin and thumb screw. Shield positions in all rotors are clearly numbered for positive identification of tubes. See Appendix B for available rotor combinations and accessories.

Front panel controls include a numeric keypad with buttons for start/stop, time and speed set, brake function, beep function, lid open, and display selection. Speed can be continuously adjusted over the range of 500 rpm (minimum) to a specific maximum, depending upon the rotor and shield combination used.

Additional safety features on the centrifuge include a transparent, shatter-proof polycarbonate cover, equipped with a positive latch. A latch interlock system prevents the centrifuge from being operated while the cover is open. Once the cover is closed and latched and the centrifuge is operating, a zero speed control switch prevents the cover from being opened (unlatched) until the rotor slows to less than one (1) revolution per second. In addition, the cover remains locked during a power fail condition, as a fail-safe precaution. If a power fail condition occurs, the cover lock may be defeated with a special tool (see Section 4.10).

An external fuse, located on the back of the centrifuge, prevents damage to the centrifuge in the event of external power surges or an internal short circuit.

SECTION 2
INSTALLATION

2.0 INTRODUCTION

This section provides information and instructions to install the Dynac III Centrifuge. Follow the unpacking and installation instructions to ensure safe and proper operation.

2.1 UNPACKING AND SITE SELECTION

Carefully unpack the centrifuge, noting any damage to the shipping carton. If damage is observed, notify the carrier immediately. After unpacking, remove the centrifuge from the polybag, and place it on a level, stable, working surface.

WARNING

The Dynac III centrifuge weighs approximately 30 pounds with a rotor installed. Use caution when lifting and moving the centrifuge.

Always operate the centrifuge on a level, stable surface,

2.2 ELECTRICAL CONNECTIONS

2.2.1 Connect the centrifuge only to a 3-wire grounded receptacle rated at 120 VAC, 60 Hz, 15 amps.

2.2.2 If an extension cord is required, use only a 3-wire grounded cord rated for 120 VAC/15 amp service.

WARNING

To avoid electrical shock, connect power cord only to an approved power source such as a 3-wire grounded receptacle. Where a 2-wire receptacle is encountered, have it replaced with a properly grounded 3-wire receptacle in accordance with the national electrical code. Do not, under any circumstances, remove the ground prong from the power plug.

NOTE

The Centrifuge may be operated between 108 volts and 132 volts. Prolonged operation at either of these voltage extremes may reduce motor life.

2.3 OPENING THE COVER (LID)

NOTE

The OPEN LID button will not function while the centrifuge is spinning; the rotor must come to a complete stop before the lid can be opened.

See Section 4.10 for instructions describing how to open the lid in case of a power failure or instrument malfunction.

2.3.1 When the centrifuge is connected to the power source, the software version number will appear briefly on the display, and then all segments of the front panel display will be illuminated for approximately one second. The display will then show **0:0**.

2.3.2 Press the **LID OPEN** button on the front panel to open the lid.

2.3.3 Within 5 seconds, press the latch, and open the top lid and remove the corrugated motor protector and cylindrical cardboard sleeve surrounding the motor. Save the shipping container and protective pieces for possible future use in transporting the machine.

2.4 INSTALLING THE ROTOR

2.4.1 The centrifuge is shipped completely assembled except for installation of the rotor. Any one of the horizontal head or angle head rotors listed in Table 4-1 can be used, depending upon test requirements.

2.4.2 All rotors are installed in an identical manner as follows:

2.4.2.1 Remove knurled retaining screw from motor shaft.

2.4.2.2 Place rotor on shaft so that drive pin in motor shaft engages slot in rotor.

2.4.2.3 Push rotor down until it seats.

2.4.2.4 Replace knurled retaining screw on motor shaft and hand-tighten snugly.

2.4.2.5 Insert the full number of shields in rotor. See Section 4.2 for important information concerning balancing the load.

WARNING

Prior to using a swingout head (420108, 420109, or 420110) refer to the product insert (p/n 0103-000-012) that is packaged with heads 420108, 420109, and 420110. The information contained in these product inserts applies to the Dynac III Centrifuge.

SECTION 3
CONTROLS AND INDICATORS

3.0 INTRODUCTION

This section provides instructions and information relating to the controls and indicators on the centrifuge.

3.1 CENTRIFUGE CONTROLS AND INDICATORS (Refer to Figure 3-1)

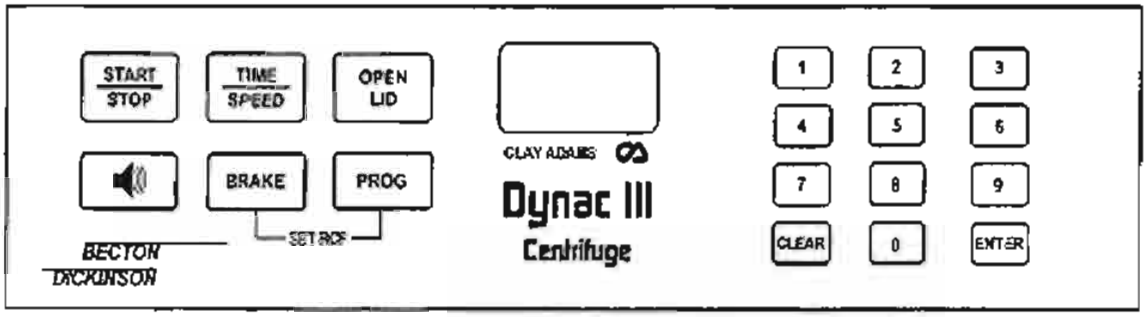

FIGURE 3-1
DYNAC III Operating Controls and Indicators

3.1.1 START/STOP Key

The **START/STOP** key has two functions. When the centrifuge is stopped, pressing this key will start the centrifuge using the last time and speed settings. Note - if the centrifuge has just been powered on, both the time and speed settings will be zero. See Section 3.1.2 below to set the time and speed.

When the centrifuge is running, pressing this key will abort the spin cycle and stop the centrifuge.

If the **START/STOP** key was pressed during the spin cycle, pressing the **START/STOP** key again will restart the centrifuge and resume the cycle, counting down from the remaining time. Pressing the **CLEAR** key at this point will clear the current cycle, and set the time and speed back to zero.

3.1.2 TIME/SPEED Key

The **TIME/SPEED** key has two functions. When the centrifuge is running, the **TIME/SPEED** key is used to select whether the display shows the centrifuge speed or the remaining time.

When the centrifuge is stopped, the **TIME/SPEED** key is used to select the entry of cycle time or speed from the numeric keypad.

In both cases, when the centrifuge is in the speed display mode, an '**RPM**' indicator will appear in the display. When the centrifuge is in the time display mode, a colon (:) will be displayed, and the **RPM** indicator will not be on.

3.1.3 OPEN LID Key

When pressed, the **OPEN LID** Key will energize the lid solenoid for 5 seconds so that the lid can be opened. The key has no effect when the centrifuge is running.

3.1.4 THE 🔊 Key

The 🔊 Key controls the operation of the internal beeper. Pressing the 🔊 Key will toggle the beep function on and off. When the beep function is on, the centrifuge will beep at the end of the spin cycle, and will also beep whenever any key is pressed. When the beep function is off, no beeps will occur. When the beep function is enabled, a 🔊 icon will appear in the display.

3.1.5 The BRAKE Key

The **BRAKE** key controls the operation of the automatic brake function. Pressing the **BRAKE** key will toggle the brake function on and off. When enabled, the brake function will apply an electronic brake at the end of the spin cycle to quickly stop the centrifuge. The centrifuge will brake within 45 seconds, depending on the rotor and load in use. When the brake function is off, the centrifuge will coast to a stop with no braking applied. When the brake function is enabled, a **BRAKE** icon will appear in the display.

3.1.6 The PROG, CLEAR, and ENTER keys

The **PROG**, **CLEAR** and **ENTER** keys are used to program preset time and speed combinations into the centrifuge. In addition, the **PROG** and **BRAKE** keys are used to program preset RCF settings. Refer to Section 4.7 for detailed information.

3.1.7 THE LCD DISPLAY

The LCD display contains 4 digits which display either the operating speed or the cycle time. The display mode is chosen by the **TIME/SPEED** key. When the centrifuge is stopped, the display will show either the speed setting, or the cycle time. When the centrifuge is running, the display will show either the time remaining in the spin cycle, or the actual speed of the centrifuge. In both cases, when the centrifuge is in the speed display mode, an '**RPM**' indicator will appear in the display. When the centrifuge is in the time display mode, a colon (:) will be displayed, and the **RPM** indicator will not be on.

SECTION 4
OPERATION

4.0 INTRODUCTION

This section provides information and instructions relating to the operation of the centrifuge.

4.1 QUICK START INFORMATION

(Refer to Section 3 for detailed information on the controls and indicators, and Sections 4.2 - 4.10 for detailed operating instructions)

4.1.1 Power up the centrifuge, and after the display reads **0:0**, press the **OPEN LID** key. Within 5 seconds, press the latch on the lid and open the lid.

4.1.2 Install the appropriate rotor and shield. See Section 4.2 below for load balancing information.

4.1.3 Close the lid.

4.1.4 Enter in the desired cycle time, using the numeric keypad. Press the **TIME/SPEED** key, and enter the desired spin speed, using the numeric keypad.

4.1.5 Press the **START/STOP** key to initiate the cycle. When the cycle is completed, press the **OPEN LID** key, and within 5 seconds, press the latch on the lid and open the lid.

4.2 BALANCING THE LOAD

4.2.1 For smooth operation and extended centrifuge life, it is important that weight be as equally distributed around the rotor as possible. For best results, use a balance to obtain loads of equal weight.

4.2.2 The angular distribution of material to be centrifuged is critical where loads are not of equal weight. If the amount of fluid in opposite tubes cannot be equalized, fill the shield around the lighter tube with water until the loads are balanced.

WARNING

Never operate the centrifuge with an unbalanced load.

Never operate the centrifuge if the lid is not securely latched in the closed position.

Never attempt to balance the load by adding weights, mercury or metal shot to bottom of tube or shield.

4.3 OPENING/CLOSING THE LID

4.3.1 To open the lid, press the **OPEN LID** button. The lid solenoid will energize for 5 seconds. Press the latch on the top of the centrifuge, and open the lid. The latch must be pressed while the solenoid is energized.

4.3.2 The **OPEN LID** button will not function while the centrifuge is spinning; the rotor must come to a complete stop before the lid can be opened.

> **NOTE**
>
> **See Section 4.10 for instructions describing how to open the lid in case of a power failure or instrument malfunction.**

4.3.3 To close the lid, close the lid, and press down firmly until a click is heard, and the lid is securely seated.

4.4 SETTING THE TIME AND SPEED

4.4.1 The time and speed can be set only when the centrifuge is not running. Observe the display, and determine if the display is in the time or speed mode. When the centrifuge is in the speed display mode, an **'RPM'** indicator will appear in the display. When the centrifuge is in the time display mode, a colon (:) will be displayed, and the **RPM** indicator will not be on.

4.4.2 To set the time and speed, press the **TIME/SPEED** key to place the centrifuge in the time display mode. The current time setting will be displayed. To use this setting, proceed to step 4.4.3. Otherwise, use the numeric keypad to enter in the desired time. If desired, the **CLEAR** key can be used first to reset the time to zero.

4.4.3 Press the **TIME/SPEED** key again to place the centrifuge in the speed display mode. The current speed setting will be displayed. To use this setting, press the **TIME/SPEED** key. Otherwise, use the numeric keypad to enter in the speed. If desired, the **CLEAR** key can be used first to reset the speed to zero. When the speed and time are entered, the centrifuge is ready to run.

Minimum settable speed is 500 RPM, and maximum settable speed is 4000 RPM. If numbers outside of this range are entered, the centrifuge will default to either 500 RPM or 4000 RPM.

4.5 SETTING THE BRAKE FEATURE

4.5.1 The automatic brake feature can be turned on or off. When the centrifuge first powers up, the automatic brake feature is off by default.

4.5.2 To enable the automatic brake feature, press the **BRAKE** key. The word **BRAKE** will appear in the display.

4.5.3 Pressing the **BRAKE** key will alternately turn the automatic brake feature off and on.

4.6 STARTING AND STOPPING

4.6.1 To start the centrifuge, ensure the time and speed are set correctly, and the lid is closed.

4.6.2 Press the **START/STOP** key to begin the spin cycle.

> **NOTE**
>
> **If the time and speed values have not been changed, pressing the START/STOP key will use the time and speed values that were used last.**

4.6.3 To stop the centrifuge press the **START/STOP** key.

4.6.4 If the centrifuge is stopped during the cycle, pressing the **START/STOP** key again will resume the cycle with the remaining time. If a new cycle is desired, press the **CLEAR** key.

4.6.5 Pressing the **TIME/SPEED** key while the centrifuge is running will alternately display the current speed, or the time remaining in the spin cycle.

4.7 PRE-PROGRAMMED TIME AND SPEED SETTINGS

4.7.1 Up to 10 speed and time combinations may be pre-programmed, or stored in the centrifuge, for later recall.

4.7.2 To program a time and speed combination, proceed as follows:

4.7.2.1 Press the **PROGRAM** key. The display will flash the letter 'P'.

4.7.2.2 Press a number key from 0 - 9. This will be the program number. The display will then flash the time value already stored for this program number. If no previous number has been stored, the display will flash a '0'.

4.7.2.3 Use the numeric keys to enter the desired cycle time. If desired, the **CLEAR** key may be used to reset the value to zero.

4.7.2.4 Enter in the desired cycle time.

4.7.2.5 Press the **TIME/SPEED** key. The display will then flash the speed value already stored for this program number. If no previous number has been stored, the display will flash a '0'.

4.7.2.6 Use the numeric keys to enter the desired speed. If desired, the **CLEAR** key may be used to reset the value to zero.

4.7.2.7 Press the **ENTER** key to lock in the value.

4.7.2.8 Repeat steps 4.7.2.1 through 4.7.2.7 to program other combinations.

4.7.3 To recall a time/speed program, proceed as follows:

4.7.3.1 Press the **PROGRAM** key. The display will flash the letter '**P**'.
4.7.3.2 Press a number key from 0 - 9. This will be the program number. The display will then flash the time value already stored for this program number. Press the **ENTER** key. The last programmed time and speed values will be used for the next spin cycle.

NOTE

The programmed time and speed values will remain in the centrifuge memory as long as the centrifuge is plugged in. Loss of power, disconnecting the power cord, or unplugging the centrifuge will reset all program values to zero.

4.8 ENTERING RCF VALUES (Using Pre-Programmed Tip Radii)

4.8.1 RCF(Relative Centrifugal Force) is calculated based on speed (RPM), and tip radius, which is dependent on the physical dimensions of the rotor and shields. The Dynac III centrifuge comes pre-programmed with 8 different tip radii, which are representative of the most popular combinations of rotors and shields. Using the built in RCF calculator, the operator may enter in a rotor/shield combination, and enter the desired RCF. The centrifuge will then calculate and set the proper speed (RPM).

4.8.2 To use this function, proceed as follows:

4.8.2.1 Press the **PROGRAM** key and the **BRAKE** key together. The display will flash the letters '**rCF**', indicating the **RCF** mode.
4.8.2.2 Use the numeric keys to enter the desired **RCF** value. If desired, the **CLEAR** key may be used to reset the value to zero.
4.8.2.3 Press the **ENTER** key. The display will then flash the letters '**HEAd**'.
4.8.2.4 Use the numeric keys to enter the rotor/shield combination. Refer to Table 4.1 for the available combinations.
4.8.2.5 Press the **ENTER** key. The RPM will be calculated and shown on the display.
4.8.2.6 The centrifuge will use this RPM value when the **START/STOP** key is pressed.

NOTE

If an invalid head number is entered, the speed will default to zero RPM.

Entering RCF values that would result in speeds below or above the acceptable RPM range will be truncated to that value. (500 RPM for the low limit, and 4000 RPM for the high limit.)

Rotor Part Number and Description*	Rotor/Shield Combination Number
420108 4-place 50 mL horizontal rotor 420999 shield	0
420109 8-place 15 mL horizontal rotor 420901 shields	1
420110 4-place 100mL horizontal rotor 420908 shields	2
420113 12-place 15 mL angle rotor 420902 shields	3
420113 12-place 15 mL angle rotor 420901 shields	4
420114 24-place 15 mL angle rotor 420902 shields	5
420114 24-place 15 mL angle rotor 420901 shields	6
420114 24-place 15 mL angle rotor 420904 shields	7

TABLE 4-1
ROTOR/SHIELD COMBINATIONS

4.9 CALCULATING RCF VALUES

4.9.1 If a rotor/shield combination that is not shown in Table 4.1 is used, follow the steps below to determine the proper RPM setting.

4.9.2 Refer to Appendix C to determine the tip radius of the rotor/shield configuration. If assistance is required, contact Becton Dickinson Microbiology Systems Technical Services at 1-800-631-8064.

4.9.3 Use the formula below to calculate the RPM required. Set the centrifuge to the RPM value as described in Section 4.4.

$$RPM = \sqrt{\frac{RCF}{28.4 * TIPRADIUS}}$$

Where: RPM = speed in thousands
RCF= Relative Centrifugal Force
TIPRADIUS= Tip Radius in inches

EXAMPLE: Calculate the RPM required for an RCF of 2200, using a tip radius of 5.75".

$$RPM = \sqrt{\frac{2200}{28.4 * 5.75}}$$

RPM = 3.670 thousand, or 3670 RPM.

4.10 MANUALLY OPENING THE LID

4.10.1 In the event of a power failure or an instrument malfunction, it may be necessary to open the lid manually. To open the lid manually, perform the following steps:

4.10.2 Ensure that the centrifuge is unplugged from any voltage source.

4.10.3 Ensure that the centrifuge has stopped running.

4.10.4 Insert the Latch Open Tool (P/N 42010401) between the latch and the solenoid cover, as shown in Figure 4-1. Insert the tool so as to contact the latch setscrew, which can be viewed between the black solenoid cover and the latch. Insert the tool until it stops.

4.10.5 Press the lid latch, and open the lid.

4.10.6 Remove the tool.

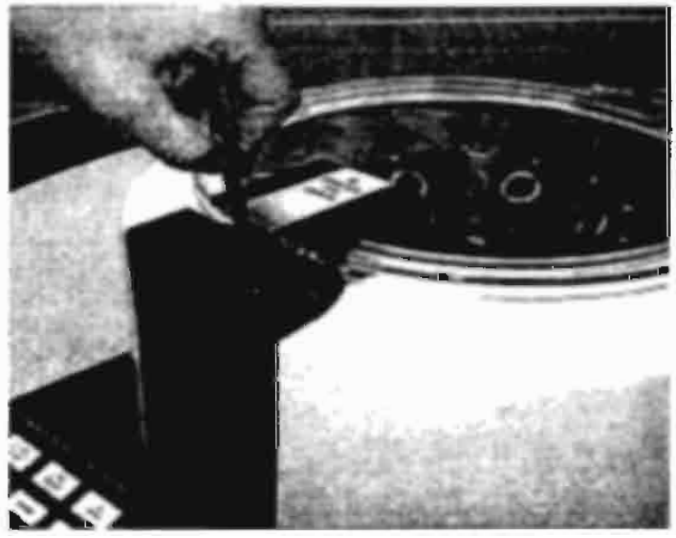

FIGURE 4-1
MANUALLY OPENING THE LID

SECTION 5
MAINTENANCE AND SERVICE

5.0 INTRODUCTION

5.0.1 This section provides information relating to maintenance, service, and repair of the Dynac III Centrifuge.

5.0.2 Maintenance and service procedures that can be performed by laboratory personnel are described below.

> **NOTE**
>
> **Do not attempt to disassemble the centrifuge beyond any point described in this manual. Doing so may invalidate your warranty.**

5.0.3 Except for replacement of a defective external fuse and inspection and replacement of motor brushes, refer other problems to a qualified service representative. The motor in the centrifuge incorporates permanently lubricated bearings. No lubrication is required for the life of the instrument.

> **WARNING**
>
> **To avoid electrical hazard, always disconnect power cord from the wall receptacle before removing bottom cover, or performing service or repairs.**

5.1 REPLACING THE EXTERNAL FUSE

5.1.1 If blown or defective, the external fuse located in the back of the centrifuge should be replaced only with a fuse of the following rating:

Type 3AG fast-acting, 6 amp fuse, P/N 42010402

5.1.2 To replace the fuse, locate the fuse holder in the rear of the instrument, and press as indicated to release the fuse. Install a new fuse in the holder and push the holder into the fuse receptacle until it locks into position.

5.2. INSPECTION AND REPLACEMENT OF THE MOTOR BRUSHES

5.2.1 Motor brushes should be inspected for wear every six months and should last for approximately 500 hours of instrument use. Brushes should be replaced if less than 6.3 mm (1/4") long. Use only genuine Clay Adams brand replacement brushes, P/N 42000102.

5.2.2 In order to inspect motor brushes. The bottom cover of the instrument must first be removed. Remove the bottom cover and inspect the brushes as follows:

5.2.2.1 Remove the shields and rotor assembly and close and latch top cover of centrifuge.

5.2.2.2 Disconnect the line cord plug from wall outlet.

5.2.2.3 Rest the centrifuge on the edge of front console and cover.

5.2.2.4 Remove the four (4) screws and rubber feet from bottom cover. Remove the bottom cover and drip pan plate.

5.2.2.5 Locate the brush caps on the left and right sides of the motor housing.

5.2.2.6 Unscrew the left brush cap and remove the spring and brush assembly, **carefully noting orientation of curved brush surface.**

5.2.2.7 Inspect the brush. Replace if worn to length of 6.3 mm (1/4") or less. **NOTE: IF THE BRUSH IS NOT WORN, REPLACE EXACTLY AS ORIGINALLY FOUND.**

5.2.2.8 To install new brushes, insert the new spring and brush assembly into the receptacle. **BEFORE INSERTING, BE SURE CURVED SURFACE OF EACH BRUSH IS ORIENTED TO MATCH CURVED SURFACE OF MOTOR HOUSING.** Replace the brush cap, and screw down the cap tightly.

5.2.2.9 Repeat with the brush on the right side of motor. Inspect and replace the brush if worn, as described above.

5.2.2.10 Re-install the drip plate, bottom cover, rubber feet and screws.

CAUTION

Always run-in new brushes. Proper performance may not occur until the centrifuge is operated for several hours with the rotor installed.

5.3 CLEANING AND DISINFECTION

5.3.1 It is recommended that interior and exterior surfaces of the centrifuge bowl and rotor be wiped occasionally with a damp cloth. A mild detergent may be used to remove stains. Keeping these parts clean will prolong the life of the centrifuge.

5.3.2 The transparent cover of the centrifuge is made of a shatter-proof polycarbonate resin, which is resistant to a wide range of laboratory chemicals. It is recommended, however, that the cover be kept clean and that spillage be wiped off as soon as possible. Use only mild detergent. Do not wipe with carbon tetrachloride, chloroform, gasoline or acetone. Other chemicals, such as aromatic hydrocarbons (benzene, toluene, xylene) and strong alkalies (sodium and ammonium hydroxide), can also damage the cover.

5.3.3 Disinfect the rotor, shields, and adapters with a solution containing a 1:10 dilution of commercial sodium hypochlorite (5%). A 1:10 dilution can be prepared by adding one (1) part household bleach to nine (9) parts of water. Soak the rotor and other parts in the dilute bleach for at least ten (10) minutes. After soaking in the dilute bleach solution, completely immerse the parts in clean water. Rinse again under running water to remove all traces of the bleach. Thoroughly dry shields and adapters; also dry the top and bottom surfaces of the rotor before re-installing. Oven-drying may be used, provided the temperature **DOES NOT EXCEED 125°F (52°C).**

CAUTION

The motor drive and head screw must be clean and dry before re-assembling the rotor.

5.4 TRANSPORTING THE CENTRIFUGE

If the centrifuge must be shipped, re-install the cylindrical cardboard sleeve and corrugated cover to protect the motor. Package the machine carefully in a strong, shock-proof container to prevent damage from vibration and impact.

5.5 TROUBLESHOOTING

If the centrifuge fails to operate properly, consult the Troubleshooting Guide in Table 5-1 to pinpoint the problem. **DO NOT ATTEMPT TO PERFORM ANY SERVICE OR REPAIR UNLESS AUTHORIZED IN THIS MANUAL.** Refer service problems to the Technical Service Department of Becton Dickinson Microbiology Systems, 1-800-631-8064 in the United States. Otherwise, contact your nearest Becton Dickinson office for assistance.

TABLE 5-1
Troubleshooting Guide
DYNAC III Centrifuge

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
1. Centrifuge fails to operate.	a) Power cord not plugged into receptacle.	a) Plug cord into receptacle.
	b) Cover not latched.	b) Close cover and latch securely.
	c) Line fuse blown.	c) Replace fuse in accordance with instructions in this manual.
	d) Motor brushes worn or defective.	d) Replace brushes in accordance with instructions in this manual.
	e) Defective internal parts.	e) Request authorized service.
2. Brake fails to decelerate rotor.	a) Brake system defective.	a) Request authorized service.
3. Centrifuge vibrates excessively.	a) Unbalanced load.	a) Balance load according to instructions in this manual.
	b) Rubber feet worn.	b) Replace feet.
4. Display not working, or blank.	a) Defective display module, or defective internal parts.	a) Request authorized service.
5. Centrifuge fails to achieve maximum speed specified for rotor combination.	a) Line voltage incorrect.	a) Check power source with accurate monitor (authorized personnel only).
	b) Defective speed control, tachometer or motor.	b) Request authorized service.
6. Lid fails to open.	a) Defective lid solenoid or internal parts.	a) Request authorized service.

SECTION 6
SPECIFICATIONS

6.0 INTRODUCTION

This section provides information relating to instrument specifications and operating characteristics.

6.1 SPECIFICATIONS

Equipment Identification:	**Clay Adams DYNAC III Centrifuge** Model 420104 (120 volts/60 Hz)	
Operating Speed:	Continuously Adjustable From: Minimum Speed - 500 rpm Maximum Speed - See Table 6-1 for speeds of rotor-shield combinations	
Electrical:	120 VAC/60 Hz/6.0 amps	
Tachometer:	Electronic Range: 0-5000 RPM Accuracy: ±2% over entire range	
Dimensions and Weights (Lid Closed):	Height:	31.75 cm (12.5")
	Width:	40.64 cm (16")
	Depth:	48.26 cm (19")
	Net Weight:	11.34 kg (25 lbs) - without rotor
Environmental Specifications:	Indoor Use Only	
	Operating Temperature Range:	2°C to 40°C.
	Storage Temperature Range:	-25°C to 60°C
	Humidity:	Up to 90 % relative humidity, non-condensing
	Elevations:	Up to 2000m Above Sea Level
	IEC 664 Pollution Degree:	Category 1
	IEC 663 Installation	Category II

For additional technical documentation, please contact the Technical Service Department of Becton Dickinson Microbiology Systems, telephone 1-800-631-8064.

6.2 MAXIMUM SPEEDS AND RCF'S

6.2.1 Maximum Velocities

Horizontal-head and angular-head rotors, rotor shields, and other accessories for use with DYNAC III are shown in Appendix B.

Table 6-1 lists maximum angular velocities and relative centrifugal forces (RCF's) obtainable with eight of the rotor-shield combinations. Angular velocities were measured with the Dynac III Centrifuge operating at 120 VAC/60 Hz. Note: Maximum velocities will vary from those listed in Table 6-1 due to changes in line voltage, frequency, load, as well as age and condition of the centrifuge.

Rotor Part Number and Description	Model 420104 at 120 V/60 Hz	
	RPM	RCF
4-place 50 mL horizontal rotor #420108 with 4 each #420999 shields	3530 Max	2456
8-place 15 mL horizontal rotor #420109 with 8 each #420901 shields	3230 Max	2083
4-place 100mL horizontal rotor #420110 with 4 each #420908 shields	3390 Max	2327
12-place 15 mL angle rotor #420113 with 12 each #420902 shields	3920 Max	2509
12-place 15 mL angle rotor #420113 with 12 each #420901 shields	3450 Max	2153
24-place 15 mL angle rotor #420114 with 24 each #420902 shields	3690 Max	2224
24-place 15 mL angle rotor #420114 with 24 each #420901 shields	3200 Max	1852
24-place 15 mL angle rotor #420114 with 24 each #420904 shields	4000 Max	2272

TABLE 6-1
Maximum Angular Velocities and Relative Centrifugal Forces for DYNAC III Centrifuge Rotors

Large deviations in line voltage and frequency will affect maximum obtainable operating speed. If supply voltage and frequency are correct, and the Centrifuge motor speed or tachometer reading is outside the specified tolerance, contact the Technical Service Department of Becton Dickinson Microbiology Systems, telephone 1-800-631-8064 in the United States.

APPENDIX A
REPLACEMENT PARTS LIST, MODEL 420104 DYNAC III CENTRIFUGE

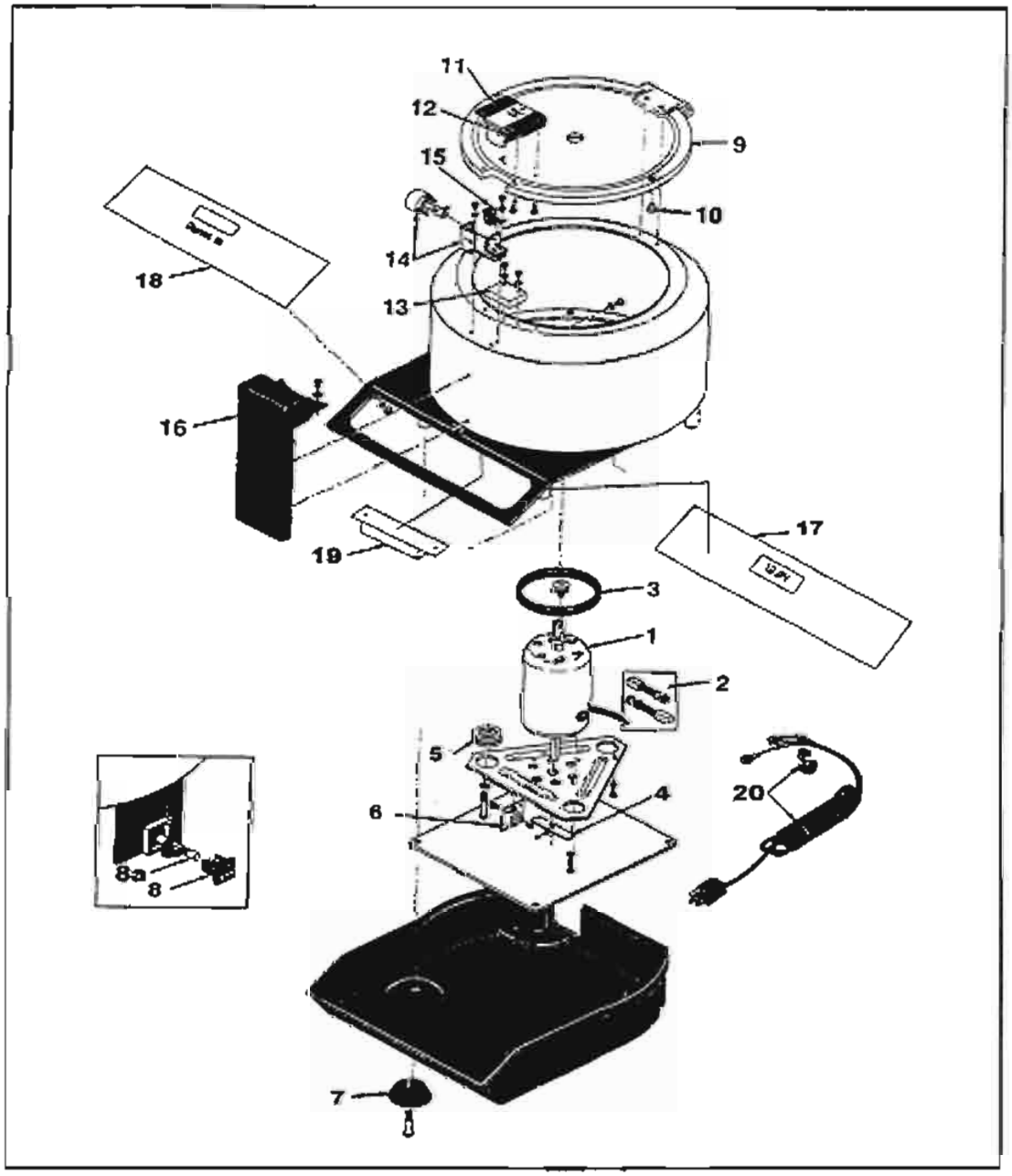

FIGURE A-1
CENTRIFUGE EXPLODED VIEW

APPENDIX B
ROTORS, SHIELDS and ACCESSORIES

Rotor (Head) Selection

CAT. NO.	DESCRIPTION	FOR USE WITH SHIELD
420108*	Horizontal-4 place	420900
420109*	Horizontal-8 place	420901, 420902, 420904, 420905
420110*	Horizontal-4 place	420908
420111	Angle-6 place	420901, 420902, 420904, 420905
420112	Angle-4 place	420900
420113	Angle-12 place	420901, 420902, 420904, 420905
420114	Angle-24 place	420901, 420902, 420904, 420905

*** REFER TO THE PRODUCT INSERT, P/N 0103-000-012, PACKAGED WITH THESE ROTORS FOR IMPORTANT INFORMATION. THIS INFORMATION APPLIES TO THE DYNAC III CENTRIFUGE ALSO.**

APPENDIX B
ROTORS, SHIELDS and ACCESSORIES

Shield Selection

CATALOG NO. & DESCRIPTION	DIMENSIONS	TUBE SIZES	ADAPTERS/SPACERS FOR VACUTAINER™ TUBES WITH HEMOGARD™ CLOSURES
420999 Stainless Steel with cushion #420941	123 x 31 mm (4 27/32 x 1 1/4") I.D. 30 mm	50 ml 40 ml heavy duty tubes	
420901 Stainless Steel with cushion #420943	118 x 18 mm (4 21/32 x 3/4") I.D. 17.6 mm	15 ml 15 ml VACUTAINER™ Blood Collecting Tubes	▸ For 13 x 75 mm tube, use #420250 and 420252 ▸ For 13 x 100 mm tube, use #420251 and 420252
420902 Stainless Steel with cushion #420943	100 x 18 mm (4 x 3/4") I.D. 17.6 mm	5 ml, 15 ml 7 ml, 10 ml VACUTAINER™ Blood Collecting Tubes	▸ For 13 x 75 mm tube, use #420250 ▸ For 13 x 100 mm tube, use #420251
420904 Aluminum, with cushion	75 x 18 mm (3 x 3/4") I.D. 13.8 mm	3 ml 10 x 75 mm 12 x 75 mm 4 and 5 ml VACUTAINER™ Blood Collecting Tubes	▸ For 13 x 75 mm tube, use #420253 spacer ▸ 13 x 100 mm tube not compatible
420905 Aluminum, with cushion	60 x 18 mm (2 3/8 x 3/4") I.D. 11.5 mm	2 ml, 1 ml and 0.5 ml tubes, 10 x 55 mm 3 ml VACUTAINER™ Blood Collecting Tubes	▸ 13 x 75 mm and 13 x 100 mm tubes not compatible
420908 Stainless Steel, with cushion #420942, supplied in balanced pairs	120 x 41.4 mm (4 23/32 x 1 5/8") I.D. 39.3 mm	100 ml tubes, 50 ml plastic tubes with screw caps	

APPENDIX B
ROTORS, SHIELDS and ACCESSORIES

Multiple Carrier Selection

CAT NO.	TUBE CAPACITY	TUBE SIZE(S)	ROTOR USED WITH
420255	5	13 x 75 mm HEMOGARD™	420110
420258	3	13 x 75 mm HEMOGARD™	420110
420259	5	13 x 100 mm HEMOGARD™	420110
420260	3	13 x 100 mm HEMOGARD™	420110
420920	9	10 x 75 mm	420110
420921	7	12 x 75 mm	420110
420922	5	13 x 100 mm or 7 ml VACUTAINER™	420110
420923	3	16 x 100 or 10 ml VACUTAINER™	420110

Shield Cushion Selection

CAT. NO.	DESCRIPTION	WHERE USED
420249	Small Black Cushion	HEMOGARD™ Adapter #420250 & 420251
420941	Rubber Cushion and Leather Disc	Shield #420900
420942	Rubber Cushion	Shield #420908
420943	Rubber Cushion	Shield #420901 & 420902
420944	Rubber Adapter	Shield #420901

APPENDIX B
ROTORS, SHIELDS and ACCESSORIES

Adapters and Spacers

CAT. NO.	DESCRIPTION	WHERE USED
420250	Adapter with cushion for 13 x 75 mm HEMOGARD™ Closure Tubes	Shield #420901, 420902
420251	Adapter with cushion for 13 x 75 mm HEMOGARD™ Closure Tubes	Shields #420901 & 420902
420252	Spacer 3/4" long for HEMOGARD™ Closure Tubes	Shields #420901
420253	Spacer 3/8" long for HEMOGARD™ Closure Tubes	Shield #420904
420931	Reducing adapter from 50 ml to 15 ml	Rotors #420108, 420112
420934	Reducing adapter from 100 ml to 50 ml	Rotor # 420110

For assistance in the United States,
call the Technical Service Department
of Becton Dickinson Microbiology Systems
1-800-631-8064

APPENDIX C
DETERMINING TIP RADII

The tip radius is a measurement of the horizontal distance from the center of centrifuge rotation to the end of the tube, shield, or adapter being spun. The tip radius depends on the rotor being used, and the type of shield, cushions, and/or adapters being used with the rotor. The following information will provide a method for determining the tip radius of various rotor, shield, and cushion combinations used in the Dynac III centrifuge.

Perform the following steps to determine the tip radius:

STEP 1 - Determine the inside depth of the shield or carrier.

1.1 Prepare the shield or carrier by inserting the appropriate cushions, spacers, or adapters.
1.2 Measure the inside depth with a steel ruler. If the diameter is too small for a ruler, insert a pencil, glass rod, or other type rod in conjunction with the ruler to determine the inside depth.
1.3 Record this reading, in inches.

Proceed to STEP 2 for Angle Head rotors, or, STEP 3 for Horizontal Swingout Rotors

STEP 2 - Angle Head Rotors: (Catalog Nos. 420111, 420112, 420113, 420114)

2.1 Multiply the number found in STEP 1.3 by .788.
2.2 Use Table C-1 to find the number 'R' for the rotor being used.
2.3 Add this number to the number obtained in STEP 2.1 above.
2.4 This number is the tip radius (in inches).

STEP 3 - Horizontal Swingout Rotors: (Catalog Nos. 420108, 420109, 420110)

3.1 Use Table C-1 to find the number 'R' for the rotor being used.
3.2 Add this number to the number found in STEP 1.3
3.3 This number is the tip radius (in inches).

Rotor Catalog Number	'R'
420108	2.125
420109	2.405
420110	2.562
420111	2.59
420112	2.44
420113	2.59
420114 (Outer Rows)	2.75
420114 (Inner Rows)	2.16

TABLE C-1

APPENDIX D
WARRANTY

CLAY ADAMS DYNAC III CENTRIFUGE

Becton Dickinson warrants the Clay Adams Dynac III Centrifuge to be free from defects in workmanship and materials for a period of 18 months from date of installation, provided the Centrifuge is operated in accordance with this Operator's Manual. During such period, Becton Dickinson agrees to replace or repair any parts which, in its sole judgment, are found to be defective, provided the Centrifuge has not been subjected to misuse or abuse. The warranty stated herein shall extend to the original consumer only and not to any subsequent consumer of the Centrifuge.

Becton Dickinson shall not be liable for any incidental or consequential damages. Becton Dickinson makes no other warranties, expressed or implied, except as stated herein.

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